

# **ENHANCING FORMAL CREDIT ACCESSIBILITY OF PIG PRODUCTION HOUSEHOLDS IN THAI BINH PROVINCE, VIETNAM**

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## **Abstract**

*This paper investigates the factors affecting the access of pig production households to formal credit in Thai Binh province. The total invested capital in agriculture and rural development in the past years increased continuously. Besides, scale of pig production in Thai Binh was expanded, and poverty levels have reduced significantly over the last years. If it is assumed that access to credit is a vehicle for poverty alleviation, it is necessary to assess how households decide on borrowing. This paper identifies the determinants of formal credit accessibility and the amount that is borrowed by using Logistic regression model and Standard multiple regression model. Data used in this paper was obtained from a survey of 100 pig production households Thai Binh, conducted from February to May 2014. The results indicate that distance to the nearest credit source, household annual income, participant to extension package program, experience in formal credit use, pig cage area and monthly expense affect the probability to ask for and amount of formal credit.*

**Keywords:** Credit, Formal credit accessibility, Pig production, Model, Financing

## **INTRODUCTION**

Pork production is an important component of Vietnamese agriculture and an important part of the Vietnamese diet and way of life. Pork is also the most widely consumed meat in the world. Vietnam is the 6<sup>th</sup> pig production country in the world. However, 80% of pig production households in the country have small scale (1-2 sows or 10-20 pigs for slaughter) (Cao Tan, 2010). Therefore invested pig production is an essential policy to ensure the development of the livestock sector and food security.

In recent years, the Government and the banking system has implemented many policies to prioritize funding for agriculture and rural development. Although the total invested capital in agriculture and rural development in the past years increased continuously (spending percentage for agriculture and rural development in total state budget increased from 32.8% in 2008 to 41.3% in 2013) but this investment is not worthy, only meet about 65-75% growth requirements (Thao Nguyen, 2013). Therefore, the pig production households lack of capital, investment or credit to expand and enhance productivity.

To our country's northern region, Thai Binh is one of the important provinces making great contributions in the development of sustainable livestock sector. So, this article aims to assess pig production situation, understand the demand for credit, determine and analyze the factors that impact on the Pig Production Households' access to credit and loan size, the advantages and disadvantages in accessing to credit and finally propose some solutions to improve pig production households' access to credit to develop and expand the pig production in Thai Binh province, Vietnam.

## **METHODOLOGY**

### **Selection of study area**

Hung Ha, Dong Hung, Vu Thu, QuynhPhu and KienXuong are five districts of Thai Binh, Vietnam where most of labor depends on agriculture for their livelihood were selected for the purpose of identifying key socio-economic and demographic factors that influence credit accessibility of pig production households. A total of 100 households were randomly chosen to interview from five those districts. This research was conducted from January 2014 to August 2014.

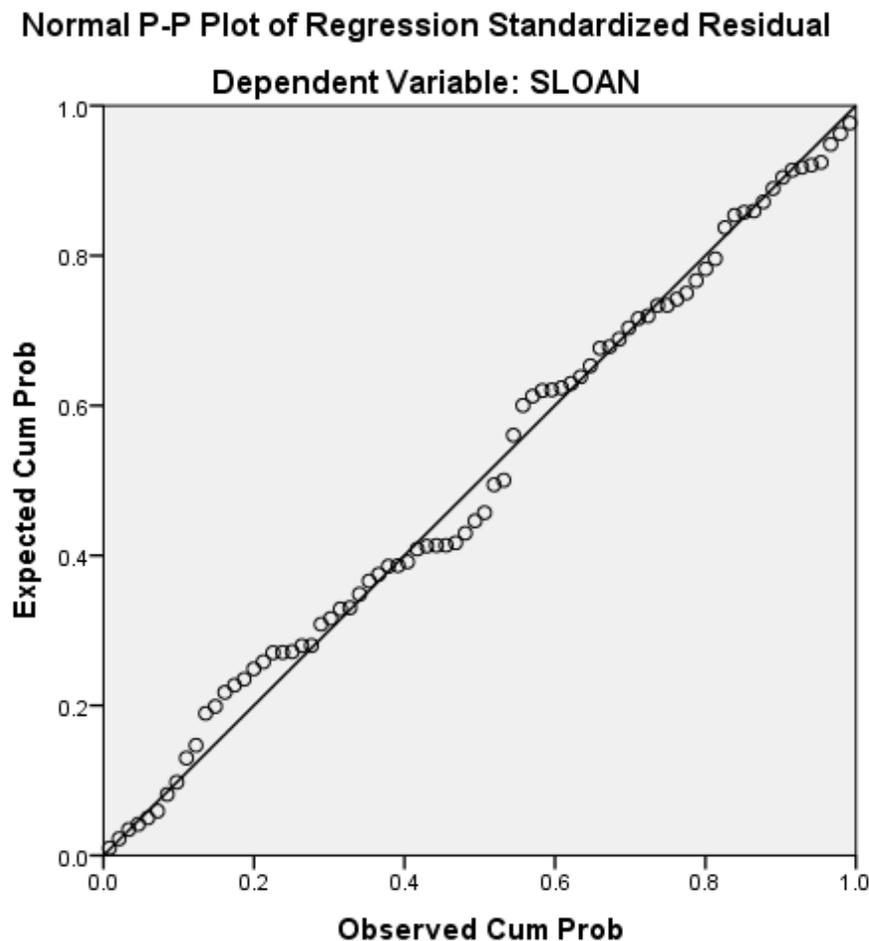
### **The assumption checking methods**

It is important to check for the presence of outliers or cases that are not well explained by my model. To ensure the accuracy and appropriateness of the model, 8 questionnaires that lack of information deleted from the sample. Besides, outliers on my dependent variables were

identified from the normal probability plot (P-P) of the regression standard residual, Mahalanobis distances and Cook's distances. After that, 10 outliers were found because they lie far away from straight diagonal line in the Normal P-P plot and have a Mahalanobis and Cook distance value exceeding critical value. Finally, after removing all outliers from this analysis, there are 82 cases in the sample.

After the presence of outliers were been checked and deleted from the sample, the technique of variance inflation factor (VIF) and tolerance were employed to detect the problem of multicollinearity among the continuous variables and the normal P-P plot were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity

Figure 1: Check normality, linearity, homoscedasticity, independence of residuals



### Analytical Approach

Both qualitative and quantitative techniques were used to analyze the data. Qualitative data that were obtained by observation, focus group discussion, and group interview were organized in

the field. Quantitative data were analyzed using descriptive statistics such as mean, percentage, standard deviation, tabulation, ratio and frequency distribution. In addition, the t-test and Chi-square statistics were employed to measure the mean and percentage differences between credit users and non-users.

In the analysis of studies involving qualitative choices, usually a choice has to be made between logit and probit models. According to Amemiya (1981), the statistical similarities between logit and probit models make the choice between them difficult. The justification for using logit is its simplicity of calculation and that its probability lies between 0 and 1. Moreover, its probability approaches zero advantage over the others in the analysis of dichotomous outcome variable in that it is extremely flexible and easily used model from mathematical point of view and results in a meaningful interpretation. Hence, the logistic model is selected for this study.

$$\begin{aligned} \text{logit}(\pi_i) &= \log\left(\frac{\pi_i}{1-\pi_i}\right) \\ &= \beta_0 + \beta_1 x_{i1} + \dots + \beta_k x_{ik} \end{aligned}$$

One of major parts in this study is to determine factors that impact on pig production households' loan amount. Here, standard multiple regression is used to evaluate the relationships between a set of independent variables and a continuous dependent variable, compare the predictive ability of particular independent variables and too find the best set of variables to predict a dependent variable.

Multiple linear regression analysis is an extension of simple linear regression analysis. The estimated model with  $p$  independent variables:

$$y_i = \beta_1 x_{i1} + \beta_2 x_{i2} + \dots + \beta_p x_{ip} + \varepsilon_i,$$

Where:  $Y$  is the predicted or expected value of the dependent variable,  $X_1$  through  $X_p$  are  $p$  distinct independent or predictor variables,  $b_0$  is the value of  $Y$  when all of the independent variables ( $X_1$  through  $X_p$ ) are equal to zero, and  $b_1$  through  $b_p$  are the estimated regression coefficients.

Each regression coefficient represents the change in  $Y$  relative to a one unit change in the respective independent variable. In the multiple regression situation,  $b_1$ , for example, is the change in  $Y$  relative to a one unit change in  $X_1$ , holding all other independent variables constant (i.e., when the remaining independent variables are held at the same value or are fixed). Again, statistical tests can be performed to assess whether each regression coefficient is significantly different from zero.

## Description of the dependent and independent variables used in the models

Table 1: Description of the dependent and independent variables used in the model

Variables	Description	Types	Expected sign	Values
<b>AGE</b>	Age of household head	Continuous	+	Years old
<b>EDU</b>	Education level of household	Continuous	+	Years of schooling
<b>DISTAN</b>	Distance from the nearest formal institution	Continuous	-	Kilometers
<b>LABOR</b>	The total number of family members of the household who have the potential to work	Continuous	+/-	Person
<b>FSIZE</b>	Pig cage area	Continuous	+	Square meter
<b>HHINCOME</b>	Household annual income	Continuous	+	Million Dong
<b>EXPER</b>	Experience in accessing formal credit	Continuous	+	Times
<b>OWNLAND</b>	Total land holding that is provided use certificate	Continuous	+	Square meter
<b>ACEXT</b>	Access to extension service	Dummy	+	0=not visited, 1= visited
<b>EXPENSE</b>	Monthly expense	Dummy	+	1= Less than 2 million 2= From 2 to 3 million 3= From 3 to 5 million 4= More than 5 million
<b>POSITION</b>	Membership of cooperatives or state agencies	Dummy	+	1= "Yes" 0 = "No"
<b>USEORNON</b>	Household used credit from formal sources or did not	Dummy		1= "Yes" 0 = "No"
<b>SLOAN</b>	Pig production households' loan amount	Continuous		Million dong

## EMPIRICAL RESULTS & DISCUSSION

### Data profiling the smallholder farmers level of access to credit

Results of the survey indicates that only 62.2% of the respondents in the study areas had access to formal credit services, while 37.8% did not have any access to formal credit services in recent two years.

This implies that the potential for improving the access to formal credit by pig production households is immense. The reasons for low levels of access may either be due to few and inaccessible credits markets or to credit markets completely missing in the study area.

Table 2: Level of formal credit accessibility by Pig Production Households in Thai Binh

USEORNON		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	31	37.8	37.8	37.8
	1	51	62.2	62.2	100.0
	Total	82	100.0	100.0	

### General profile of surveyed households

The data has been analyzed using descriptive statistics. Accordingly, the average family size of the sample respondents was found to be 4 persons. The largest family size was 7 and the smallest was 2. The average age of all households who access to formal credit and did not access to formal credit is 4.04 and 3.77, respectively. The average age of the household heads was 46.83 years. The youngest farmer among the pig production households who accessed credit service was 30 years old while the age of the oldest farmer was 59 years. Among those pig production households who did not access credit financial services, the youngest farmer was 27 years old and oldest farmer was 65 years old. The average age of formal credit users and non-users was 47.22 and 46.19 years respectively. The average education level of formal credit users and non-users was 9 and 8.52 years respectively. As indicated by the results, 52.4 percent of the total surveyed farming household has monthly expense from 3 to 5 million. There are not any households that access to formal credit has monthly expense less than 2 million. Nearly 80 percent of the formal credit users have monthly expense more than 3 million and all of the non-users have monthly expense less than 5 million. The number of respondents who participated in the extension package program was 68.3 percent. Out of the total respondents, there are 56 people who access extension services, 46 people from the credit users and 10 people from the non-users have participated in agricultural extension package program.

Table 3: Characteristics of surveyed households

Indicator	Unit	Mean	
		USERS (1)	NON-USERS (2)
Family size	People	3.77	4.04
Age of household head	Years old	46.19	47.22
Distance to the nearest formal credit institution	Kilometer	7.25	8.94
Education level of household head	Years of schooling	9	8.52
Annual income	Million dong	107.59	80.39
Pig cage area	Square meter	126.69	117.42
Experiment in using formal credit	Times	1.94	0.13

### Factors influencing pig production households' access to formal credit

The study hypothesized that age (AGE), education level (EDU), number of major labors in family (LABOR), total size of land holding (OWNLAND), pig cage area (FSIZE), total annual income (HHINCOME), access to extension services (ACEXT), distance to the nearest formal credit institution (DISTAN), monthly expense (EXPENSE) and experience in formal credit use (EXPER) as the most important factors that could influence access to formal credit services in the study area.

Following the results of the logistic model, only four variables were significant in influencing access to formal credit services of pig production households in Thai Binh. Total annual income (HHINCOME), experience in formal credit use (EXPER) were significant with positive effects while access to extension services (ACEXT) and distance to the nearest formal credit institution (DISTAN) was significant with negative effects on the dependent variable.

Table 4: Logistic regression predicting likelihood of formal credit accessibility

	B	S.E.	Wald	df	Sig.	Exp(B)
AGE	-0.1	0.107	0.872	1	0.35	0.905
EDU	0.041	0.225	0.034	1	0.854	1.042
LABOR	-0.198	1.048	0.036	1	0.85	0.82
EXPENSE			0.057	3	0.996	
DISTAN	-0.449	0.216	4.338	1	.037**	0.638
OWNLAND	-0.002	0.003	0.591	1	0.442	0.998
FSIZE	-0.003	0.005	0.264	1	0.607	0.997
HHINCOME	0.032	0.019	2.745	1	.098*	1.033
ACEXT	-3.117	1.303	5.723	1	.017**	0.044
EXPER	3.024	1.115	7.358	1	.007***	20.565
Constant	27.943	7559.26	0	1	0.997	75.257

a. Variable(s) entered on step 1: AGE, EDU, LABOR, EXPENSE, DISTAN, OWNLAND, FSIZE, HHINCOME, ACEXT, EXPER.

b. \*: Significant at 10%; \*\*: Significant at 5%; \*\*\*: Significant at 1%.

This result indicated that respondents who have experience in formal credit use were 20.6 times more likely to access to formal credit than who did not have any experience in formal credit use, controlling for all other factors in the model. Experience of households in formal credit use (EXPER) is an important variable in this model. The mean difference between the formal credit user and non-user groups was significant at 1% level of significance. That means, farmers experience in credit use from the formal financial institutions plays a significant role in accessing credit from these sources. This finding is similar to Sisay Yehuala's study (2008).

While distance was quite significant at 5% in explaining access to formal credit financial services it had a negative effect. An increase in distance to a credit financial institution reduces the chance of accessing credit financial services by 0.638 times. In the event that credit financial institutions are not available in a particular area, farmers may resort to other informal means of accessing credit such as family, friends and merry go rounds. In extreme cases they may dispose their assets to raise the needed funds. There is need therefore to take steps to take credit services to the people, especially in the rural areas. Annual income is also the other variable that significantly affects access to formal credit. At first, annual income of the household was expected to either negatively or positively influence access to formal credit services. The results indicated that the annual income of the household was significant at 10% and positive influence on probability of accessing credit financial services. The above results are similar to those of previous studies (Bui Thi Minh Tho, 2010; YoyceChemeiKeplimo, 2013; Hussien, 2007). Households wealth tend to settle at a given production technology which has a one-time cost, so they need to access formal credit. This proved that they are not satisfied with the income that they are achieving. They always look for capital to expand production and business. Here, also thanks to the effective use of loans brought high annual income for pig production households in Thai Binh. People who have low income scares of risk and don't dare using credit.

The odd ratio of 0.044 for access to extension services was less than 1, indicating that for even additional participant in extension package program were 0.044 times less likely to formal credit accessibility of Pig production households in Thai Binh. This is opposite to previous studies (YoyceChemeiKeplimo, 2013; SisayYahuala, 2008, Owuor, 2009). Although, this is not a big influence (0.044) compare to other factors but it also indicated that extension service in Thai Binh province is not really effective. Local extension service did not yet provided information necessary and useful for farmers. Information in package program was provided old and repetitive. The seed and animals had been brought to the local not yet brought economic efficiency and make people lose faith in local extension services. Furthermore, 92% of respondents said that they had to find out information about the credit institutions by themselves. There is not any essential information to farmers regarding agricultural interventions such as farm production technologies, facilitating farm management, marketing and processing equipment, while all of which call for credit financial access. Therefore, local extension services did not motivate to expand production and access formal credit. In Owuor's study area, he said that "farming households' access more extension service; they tend to increase their chances of accessing credit through the understanding of new farming technologies that requires credit facilities". But in Thai Binh province, Pig production household

participate in extension package program to receive allowance or references. They said that “Information in extension programs is virtually no useful to us”. The extension staff did not understand farmers’ needs, not updating new production technology, or in other words the quality of extension services and responsibilities of extension staff is very low.

In Thai Binh province, age, education level or land ownership is no longer a determinant of access to credit by pig production farmers anymore. There is not any illiterate household head and do not have any households without land use certificate. They are capable of reading or information access. The majority pig production farmers are working age. Therefore, formal credit accessibility depends on the boldly approached by pig production farmers, providing information from the agricultural extension program, local authorities and the distance to the formal credit institutions is also one of factors affecting pig production households’ formal credit accessibility in the study area.

### **Factors influencing on pig production households’ size of loan.**

Standard multiple regression was used to determine and analyze factors influencing on pig production households’ size of loan in Thai Binh province and performed 51 households which accessed to formal credit in 2013. This model includes ten variables: age (AGE), education level (EDU), number of major labors in family (LABOR), total size of land holding (OWNLAND), pig cage area (FSIZE), total annual income (HHINCOME), access to extension services (ACEXT), monthly expense (EXPENSE), experience in formal credit use (EXPER) and membership of cooperatives or state agencies of family members (POSITION).

Following the results of standard multiple regression, pig production households’ loan amount was positively related to the pig cage area (FSIZE), household annual income (HHINCOME) and monthly expense (EXPENSE). In this result, the largest beta coefficient is 0.498, which is for household annual income (HHINCOME). This means that that this variable makes the strongest unique contribution to explaining the loan amount of pig production households, when the variance explained by all other variables in the model is controlled for. The estimated coefficient of the variable income is positive and statistically significant at 1% level. This also means that increase in annual income will be an encouragement for expansion in production which invariably leads to higher demand for loan and hence increase in loan size of pig production households. Previous studies also had a similar findings (Tran Ai Ket et al, 2013; Nguyen QuocOanh and Pham Thi My Dung, 2010; Nuryartono et al, 2005). More precisely, an increase in income by 1% will increase loan amount by 0.498% on average. In the other words, household annual income uniquely explains 17 percent (square part correlation coefficient,  $0.409^2$ ) of the variance in loan amount.

Table 5: Standard multiple regression for pig production households' loan size

Model	Unstandardized	Standardized	t	Sig.	Correlation	
	Coefficients	Coefficients			Partial	Part
	B	Beta				
(Constant)	-41.501		-.558	.580		
AGE	-1.816	-.185	-1.434	.159	-.221	-.136
EDU	-3.576	-.111	-.964	.341	-.151	-.091
EXPENSE	25.929	.208	1.863	.070*	.283	.176
POSITION	-12.034	-.069	-.666	.509	-.105	-.063
OWNLAND	-.029	-.093	-.722	.475	-.113	-.068
FSIZE	.325	.388	3.645	.001***	.499	.345
HHINCOME	.854	.498	4.329	.000***	.565	.409
EXPER	5.064	.092	.848	.402	.133	.080
LABOR	-.175	-.002	-.017	.987	-.003	-.002
ACEXT	32.671	.135	1.124	.268	.175	.106

a. *Dependent Variable: SLOAN*

b. \*: Significant at 10%; \*\*: Significant at 5%; \*\*\*: Significant at 1%.

Pig cage area (FSIZE) coefficient is also significant at 1% and positively signed. It is also argued that the larger the farm size of pig production households, the higher the possibility of generating higher income generated from the farm. Thus, borrowers with larger pig cage area are less likely to default on loan repayment. So they can borrow more. Here, until 12 percent ( $0.345^2$ ) of the variance in loan amount of pig production household is explained by pig cage area. There is a similar result to a study in Hai Duong province (2012), Nguyen Thi Minh Chau et al shown that area of fish pond is one of key factors affecting the loan amount of fish-breeding man approved by the banks. It is clearly that a bigger pig cage area is an advantage of pig production household to access a big loan.

Monthly expense includes expenditures on gas, water, electricity, education, food consumption, healthcare, telephone, entertainment, and transport, so on. This is a new variable in this model and indicated that have no serious multicollinearity problem with explanatory variables in chapter 3. The results indicated that the monthly expense of the household was significant at 10 percent. More specially, an increase in monthly expense by 1% will increase loan amount by 0.283% on average. According to many study such as Linda Richard (2007) or Sutherland (2004), when income rises, consumption increases. Of course the high-income households are easily accessible to big loans. Other reason makes high monthly expense be high share of education expense on the total budget. Aggregated from survey data, a large amount of formal credit users use their loans for payment of children's school fees. At present, Government has many preferential loans policies to support education expense for rural households so they can access to big loan from formal credit institutions.

As discussed above, extension service in Thai Binh province is not really effective. Extension staff does not have close links with formal credit institutions. So, family members or acquaintances are membership of cooperatives or state agencies (POSITION) having no useful in accessing the large amount of formal credit

### **Advantages and disadvantages of Pig production households when accessing to formal credit**

Aggregated from the opinions of the respondents, table 6 summaries main differences between formal (VBARD and VBSP) and informal lenders.

Table 6: Comparison between VBARD and VBSP to informal lenders

	VBARD and VBSP	Informal lenders
Clients targets	Favor of a larger scale, special targeting of the poor and literate clientele	Small farmers in rural areas, and for lower income households
Administrative procedures	Complex procedures	Simple and straightforward procedure
Collateral	Required land use certificate or other assets	Depending on the relationship between lenders and borrowers.
Interest rate	Medium	High
Loan size	Large	Small
Loan term	Short	Long
Repayment rate	Low	High

In Thai Binh province, most of the pig production households' credit is provided by formal credit sources. A very small proportion of farmers accessed to informal credit. Hence, formal credit institutions have especially important roles to motivate, support and develop pig production household economic.

However, their formal credit accessibility is limited and in difficulty. Although being part of government programs, the formal institutions seem not to be able to adequately respond to the demand for credit by the households. First, not all households who would like or need to take out credit are accepted as clients because they fail to provide a proof of sufficient collateral. Secondly, the terms of loans may not be appropriate. Especially the limited length of the loan may be restrictive to farmers who need the loan for an investment early in the planting season while they can only repay at the harvest, too late for the bank. Thirdly, the administrative procedures could be a serious burden to the rural household. Potential borrowers need to hand in application forms, production plans, and guarantee evidence. And they get repayment plans and claims in return. These procedures may be too important burden for low educated rural households.

The maximum repayment term from both VBARD and VBSP is long been limited. Moreover, the repayment time for agricultural loans was immediately after crops are harvested. This is difficult for farmers in ability to pay if they are in production risk.

In choosing their creditors, the farmer-respondents valued accessibility. The access considerations include their ability to easily get cash of any amount, with no collateral requirements, and nearby to their residence. If there are minimal requirements, fast processing of documents is what they want.

The farmer-respondents suggested some measures to improve their credit accessibility. One suggestion is that the government should provide more credit programs in the area which are not commodity specific, and credit programs with enough funds. Another suggestion is a credit offering for livelihood assistance. The credit offerings of the three existing credit services are for crop production, specifically for rice farmers. Organizing a farmers' association in the research area is also suggested by the farmer-respondents so government credit programs can easily be passed through the association and generate easy access for the members. Through the association, participation of farmers is also encouraged. The farmer-respondents also suggested that training in obtaining loans should be provided to everyone, not selectively, that education about savings mobilization should be provided because they wanted to have a credit scheme in which they can save and then borrow from the group the amount of money they have put in. This kind of scheme will provide easy and periodic availability of credit due to rotation of savings.

## CONCLUSIONS

At present, in Thai Binh province, the credit supply of the formal sector did not meet the credit need of pig production households. Credit accessibility of the animal production households affected by both demand side and supply side. With respect to demand side, household annual income and experience in formal credit use were the major positive factors; participant in extension service and distance to the nearest formal credit institution were negative factors affecting pig production households' formal credit accessibility. It also found that monthly expense, pig cage area and household annual income were dominant factors positively influencing on loan size from the formal sector.

Farmers need to make many stable sources of income to have a better access to formal credit. Depending on sources of income such as pig production is not ensure the monthly expense and liquidity. Nowadays group lending becomes the most important method of providing rural credit, especially the poor and very poor farmers. In which, Women's Union and Farmers' Association has a particularly important role to provide necessary information and

motivate them make a group to enhance formal credit accessibility. The Vietnam Women's Union and Farmers' Associations (FA) need to encourage pig production farmers to save in groups to take advantage of ease of accessing and obtaining credit from credit institutions and utilize this money from credit providers. Innovative content, updating new information, clearly training plans for farmers are something that local authorities should care to enhance credibility with farmers and bring the real effectiveness of the innovation and improvement of the living standard. In line with this, savings mobilization programs should be developed and promoted in the area, which will encourage participation and provide incentives for farmers to save and recycle their funds.

Financial organizations need to know who they are able to reach in order to broaden their clientele base; and on the other hand, it is important to know how much people borrow and by what this is determined, in order to address the demand for credit in a better way. The study further recommends the establishment of credit / loans offices close to farmers and operated by bank officials who would be familiar with farmers in the area to reduce lending procedures, risks and educate them on perceptions on loan repayment. This study suggests that most of households in the surveyed location have limited information on formal credit accessibility. Sometimes, the households are in need of credit, they would like to borrow from formal credit sectors but they could not know what to do. Financial institutions could make more efforts in exchanging and transferring information on the credit procedures in the rural villages. This would arguably not only increase the potential interest of households, but also improve the compliance of the clients to the bank's rules and regulations. Moreover, financial institutions need to innovate and upgrade their activities such as human resource management, encouragement policies as well as apply new technologies in bank transfer. These will promote the financial institutions to reach more clients more effectively and efficiently. Furthermore, diversifying the type of loans offered and loan products such as lending for project investments could help rural households to plan loan expenses based on their production cycles. In addition, financial institutions could adapt the loan products to their rural clients' constraints. Finally, the institutions should consider the loan duration by focusing on medium and long-term loan contracts that could help for example to mobilize the agricultural and rural development. Developing specific proposals towards these types of credit widening and deepening for pig production farmers is an area for future research.

## **LIMITATIONS OF THE STUDY**

The study was limited to small pig production households' participant and non-participants in the formal credit market. The study also relied on farmer memory to capture data as most farmers

had no records and hence the accuracy of most of the data collected was dependent on individual's ability to recall

Some of farmers were reluctant to frankly answer to some of the questions, and also farmers do not keep records and due to memory lapse, some of the questions lack exact answers. However, it is believed that the data obtained provides a useful basis of information for making recommendations to improve access to formal credit by the majority-farming households in the study area.

In this research an attempt has been made to explore and understand the determinants of formal credit accessibility and loan size. Because of the limited time allotted for the fieldwork and the small sample size, the research reflects only the situation of pig production households in the study area chosen. This may vary from those of other communities in the region and in other parts of the country.

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